

**UNITED STATES DEPARTMENT OF COMMERCE****United States Patent and Trademark Office**

Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
-----------------	-------------	----------------------	---------------------

09/161,520 09/29/98 SATO

J SON-1450/DIV

EXAMINER

IM52/0810

RONALD P. KANANEN, ESQ
RADER, FISHMAN & GRAUER PLLC
1233 20TH STREET NW, SUITE 501
WASHINGTON DC 20036

BLUEKER, R

ART UNIT

PAPER NUMBER

1763

DATE MAILED:

08/10/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/161,520

Applicant(s)

Sato

Examiner

R Bueker

Group Art Unit

1763

— The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address —

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE three MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- ☒ Responsive to communication(s) filed on March 30, 2001
- ☐ This action is **FINAL**.
- ☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- ☒ Claim(s) 12-14, 16-22 + 24-27 is/are pending in the application.
- Of the above claim(s) _____ is/are withdrawn from consideration.
- ☐ Claim(s) _____ is/are allowed.
- ☒ Claim(s) 12-14, 16-22 + 24-27 is/are rejected.
- ☐ Claim(s) _____ is/are objected to.
- ☐ Claim(s) _____ are subject to restriction or election requirement

Application Papers

- ☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.
- ☐ The drawing(s) filed on _____ is/are objected to by the Examiner
- ☐ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

- ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119 (a)-(d).
- ☐ All ☐ Some* ☐ None of the:
- ☐ Certified copies of the priority documents have been received.
- ☐ Certified copies of the priority documents have been received in Application No. _____.
- ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a))

*Certified copies not received: _____

Attachment(s)

- ☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____ ☐ Interview Summary, PTO-413
- ☒ Notice of Reference(s) Cited, PTO-892 ☐ Notice of Informal Patent Application, PTO-152
- ☐ Notice of Draftsperson's Patent Drawing Review, PTO-948 ☐ Other _____

Office Action Summary

Art Unit: 1763

*dropped
in first*

Claims 17-18, 22 and 24-27 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicant's specification as originally filed did not disclose the presently claimed steps of (1) forming a polishing slurry of boehmite by dipping particles of aluminum in heated water and (2) using the slurry formed in the first step to polish a film on a substrate. What the specification actually discloses at page 13, lines 8-16, is (1) forming a polishing slurry of boehmite by suspending boehmite in a solution of KOH/water/alcohol, (2) using that slurry to polish film on a substrate, and (3) a method of manufacturing boehmite particles by dipping aluminum particles in hot water (and optionally adding sodium aluminate to the hot water). The specification as originally filed did not disclose that the boehmite manufacturing step is included in the slurry forming step. The specification as originally filed did not disclose that the step of forming the polishing slurry includes the use of heated water. The specification as originally filed did not disclose a step of adding sodium aluminate to a polishing slurry.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Art Unit: 1763

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371© of this title before the invention thereof by the applicant for patent.

dropped in final Claim 21 is rejected under 35 U.S.C. 102(a), (b) or (e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Cote (4,956,313) or Neville (5,527,423).

Cote (col. 5, lines 1-39) and Neville (5,527,423) both teach the step of CMP planarizing a thin film formed on a substrate, wherein the CMP is performed using an alkaline pH slurry containing abrasive particles made of Al_2O_3 . Al_2O_3 is harder than SiO_2 . See page F-18 of the CRC Handbook, where the table titled "Comparison of Hardness Values of Various Material on Mohs and Knoop Scales" shows that Al_2O_3 is harder than SiO_2 . While Cote does not explicitly state that his process is a CMP process, such is inherent or at least clearly obvious to one skilled in the art. Neville does not explicitly state that the alkaline Al_2O_3 slurries of his disclosure are for planarizing a thin film on a substrate, but such is inherent or at least clearly obvious to one skilled in the art.

maintained in final Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cote in view of Wang. Cote discloses a CMP polishing process in which an alkaline alumina slurry is used to planarize a tungsten coated wafer. Cote does not discuss the use of boehmite. Wang also discloses a CMP polishing process in which an alumina containing slurry is used to planarize a tungsten coated wafer. Wang teaches that it is desirable to substitute boehmite for 50% to 99% of the alumina, because boehmite is less abrasive. It would have been prima facie obvious to one skilled in the art to substitute boehmite for the alumina of Cote, using the amounts of boehmite

Art Unit: 1763

suggested by Wang, because Wang teaches (col. 4, lines 12-16) that the use of the less abrasive boehmite desirably increases the metal/dielectric polishing selectivity. Regarding claims 13 and 14, it is noted that claims 12-14 are drawn to a method of using a slurry which contains boehmite. The language of claims 13 and 14 recite how the boehmite was made, and these limitations are in the nature of a product-by-process limitation. A product-by-product limitation is treated as described in MPEP 2113. As indicated therein, a product-by-process limitation does not exclude other products made by other processes, if the products themselves are prima facie not distinguishable from the claimed product by process. Therefore, the boehmite described in claims 13 and 14 do not distinguish over the boehmite of Wang. If applicant intends that the method step of forming the boehmite be included in the recited method of polishing, then the claims should be written to positively recite each step of the complete process.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cote in view of Wang taken in further view of Wefers (Alcoa Technical Paper). Wefers teaches (page 15, lines 31-34) that boehmite can be formed by treating aluminum with hot water, and it would have been prima facie obvious to use boehmite formed by this method in the process taught by Wang.

Claims 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang in view of Krussell (5,723,019) and Winebarger (5,478,436). Wang discloses a CMP process for planarizing a film on a semiconductor wafer by polishing with a slurry containing abrasive particles that consist essentially of boehmite. Wang does not discuss the step of removing the slurry after the polishing step is finished. Both Krussell (col. 4, lines 35-39) and Winebarger (col.

Art Unit: 1763

1, lines 38-42 and 62-65) teach the step of cleaning a wafer after CMP to remove the contaminants left by the CMP process. Krussell teaches a process of centrifugal (spin) cleaning (col. 2, lines 15-17), and it would have been prima facie obvious to one skilled in the art to spin clean the wafer of Wang in view of Krussell. It is noted that Krussell also teaches brush cleaning and Fig. 1 of Krussell shows that the brushes are adapted to rotate (spin) which reads on applicant's "spin cleaner". Krussell (col. 1, lines 50-65 and col. 6, lines 61-65) and Winebarger (col. 1, lines 62-65) teach that the rinsing agents used by applicant are commonly known in the art to be compatible with cleaning a CMP processed wafer. It would have been prima facie obvious to one skilled in the art to use such known rinsing agents to clean the wafer of Wang after CMP.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang in view of Krussell and Winebarger, taken in further view of Wefers. Wefers teaches (page 15, lines 31-34) that boehmite can be formed by treating aluminum with hot water, and it would have been prima facie obvious to use boehmite formed by this method in the process taught by Wang.

Claims 12-14 and 21 are rejected under 35 U.S.C. 102(a) or (e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Yamada. Yamada discloses a process of polishing a thin film (col. 4, lines 64-68) on a substrate to remove scratch marks, range peel, pits, nodules or cracks (col. 1, lines 19-24) which inherently results in a more planar surface. Yamada teaches the use of boehmite in his polishing slurry, and teaches that the pH can be up to 8 (col. 4, lines 31-32, which includes the use of an alkaline slurry. Therefore, a "basic atmosphere" is inherently disclosed or at least prima facie obvious from Yamada.

Art Unit: 1763

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada in view of Wefers. Wefers teaches (page 15, lines 31-34) that boehmite can be formed by treating aluminum with hot water, and it would have been prima facie obvious to use boehmite formed by this method in the process taught by Wang.

Claims rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The phrase "basic atmosphere" in claims 12-14 and 25 is nonidiomatic, vague and indefinite.

Claims 14, 20 and 22, and 24-27 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The claimed recitation of adding sodium aluminate during the manufacture of boehmite is not properly enabled by the specification as originally filed. The specification at page 13, lines 15-16, states "it is effective to add sodium aluminate to the hot water, as needed". Applicant has failed to disclose how much sodium aluminate is to be added, under what conditions it is to be added, or why it is to be added. It is noted that Wefers teaches that boehmite can be manufactured by treating aluminum with hot water alone. Applicant has failed to disclose why or how the additional inclusion of sodium aluminate would differ from what is taught by Wefers.

Art Unit: 1763

Applicant has argued that the claim 16 language of "abrasive particles consisting essentially of boehmite" excludes the use of alpha alumina particles of as little as 1% by weight of abrasives, as taught by Wang. MPEP 2111.03 explains the meaning of the phrase "consisting essentially of". This phrase limits the scope of a claim to the specified materials or steps "and those that do not materially affect the basic and novel characteristic(s)" of the invention. *In re Herr*, 190 USPQ 461,463. There is nothing in the record of the present case that would indicate that the inclusion of 1% alpha alumina in applicant's boehmite abrasive would materially affect any basic and novel characteristic of applicant's polishing process. "When an applicant contends that additional steps or materials in the prior art are excluded by the recitation of "consisting essentially of", applicant has the burden of showing that the introduction of additional steps or components would materially change the characteristics of applicant's invention". *In re De Lajarte*, 143 USPQ 256.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Bueker whose telephone number is (703) 308-1895.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Richard Bueker
RICHARD BUEKER
PRIMARY EXAMINER
ART UNIT 1763